

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Subirrigated

Site ID: R060AY003SD

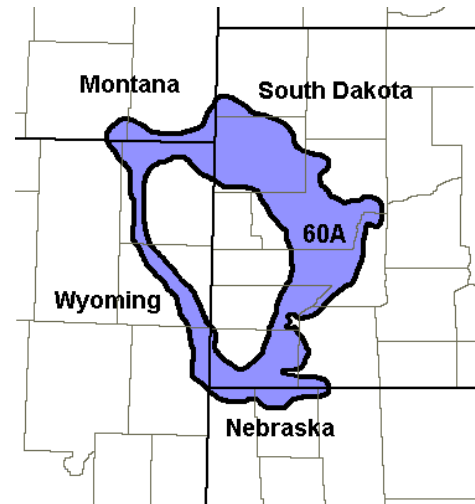
Major Land Resource Area: 60A – Pierre Shale Plains

Physiographic Features

This site occurs on level to nearly level river valleys.

Landform: flood plain, stream terrace

Aspect: N/A



	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2500	4300
Slope (percent):	0	3
Water Table Depth (inches):	12	36
Flooding:		
Frequency:	Occasional	Frequent
Duration:	Brief	Long
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Negligible	Medium

Climatic Features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland steppes to the east. Annual precipitation ranges from 13 to 18 inches per year, with most occurring during the growing season. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air masses from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. The normal average annual temperature is about 46° F. January is the coldest month with average temperatures ranging from about 19° F (Moorcroft CAA, WY) to about 22° F (Belle Fourche, SD). July is the warmest month with temperatures averaging from about 70° F (Moorcroft CAA, WY) to about 72° F (Belle Fourche, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 51° F. Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

RANGELAND INTERPRETATIONS

Page 2

Growth of cool season plants begins in early to mid March, slowing or ceasing in late June. Warm season plants begin growth about mid May and can continue to early or mid September. Green up of cool season plants may occur in September and October when adequate soil moisture is present.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	122	129
Freeze-free period (days):	145	152
Mean Annual Precipitation (inches):	13	18

Average Monthly Precipitation (inches) and Temperature (°F):

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.32	0.43	7.1	34.1
February	0.44	0.57	12.6	40.1
March	0.65	0.94	19.7	46.5
April	1.43	1.72	29.4	60.2
May	2.45	3.19	39.7	70.6
June	2.34	3.38	48.5	80.1
July	1.60	2.78	54.8	88.0
August	1.24	1.76	53.1	87.7
September	1.01	1.50	42.3	77.0
October	0.90	1.11	31.4	64.9
November	0.40	0.61	19.8	47.5
December	0.40	0.48	10.2	38.0

Climate Stations		Period	
Station ID	Location or Name	From	To
SD0236	Ardmore 2 N	1948	1999
SD0559	Belle Fourche	1948	1999
SD1124	Buffalo Gap	1951	1999
WY6395	Moorcroft CAA	1948	1998
WY9207	Upton 13 SW	1949	1998

For other climate stations that may be more representative, refer to <http://www.wcc.nrcs.usda.gov>.

Influencing Water Features

Wetland Description:	<u>System</u>	<u>Subsystem</u>	<u>Class</u>	<u>Sub-class</u>
Cowardin, et. al., 1979	Palustrine	N/A	Emergent Wetland	Persistent

Stream Type: None
(Rosgen System)

Representative Soil Features

The soils in this site are somewhat poorly to moderately well drained and formed in loamy alluvium. The surface layer is 4 to 15 inches thick. The texture of the subsurface ranges from loamy fine sand to silty clay loam. Slopes range from 0 to 3 percent. This site should show no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

Parent Material Kind: alluvium
Parent Material Origin: sedimentary, unspecified
Surface Texture: loamy fine sand, silt loam, silty clay loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy, sandy
Surface Fragments $\leq 3''$ (% Cover): 0
Surface Fragments $> 3''$ (%Cover): 0
Subsurface Fragments $\leq 3''$ (% Volume): 0
Subsurface Fragments $> 3''$ (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	somewhat poorly	moderately well
Permeability Class:	moderately slow	rapid
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	5
Soil Reaction (1:1 Water)*:	7.4	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	4	8
Calcium Carbonate Equivalent (percent)*:	0	15

* - These attributes represent from 0-40 inches or to the first restrictive layer.

Plant Communities

Ecological Dynamics of the Site:

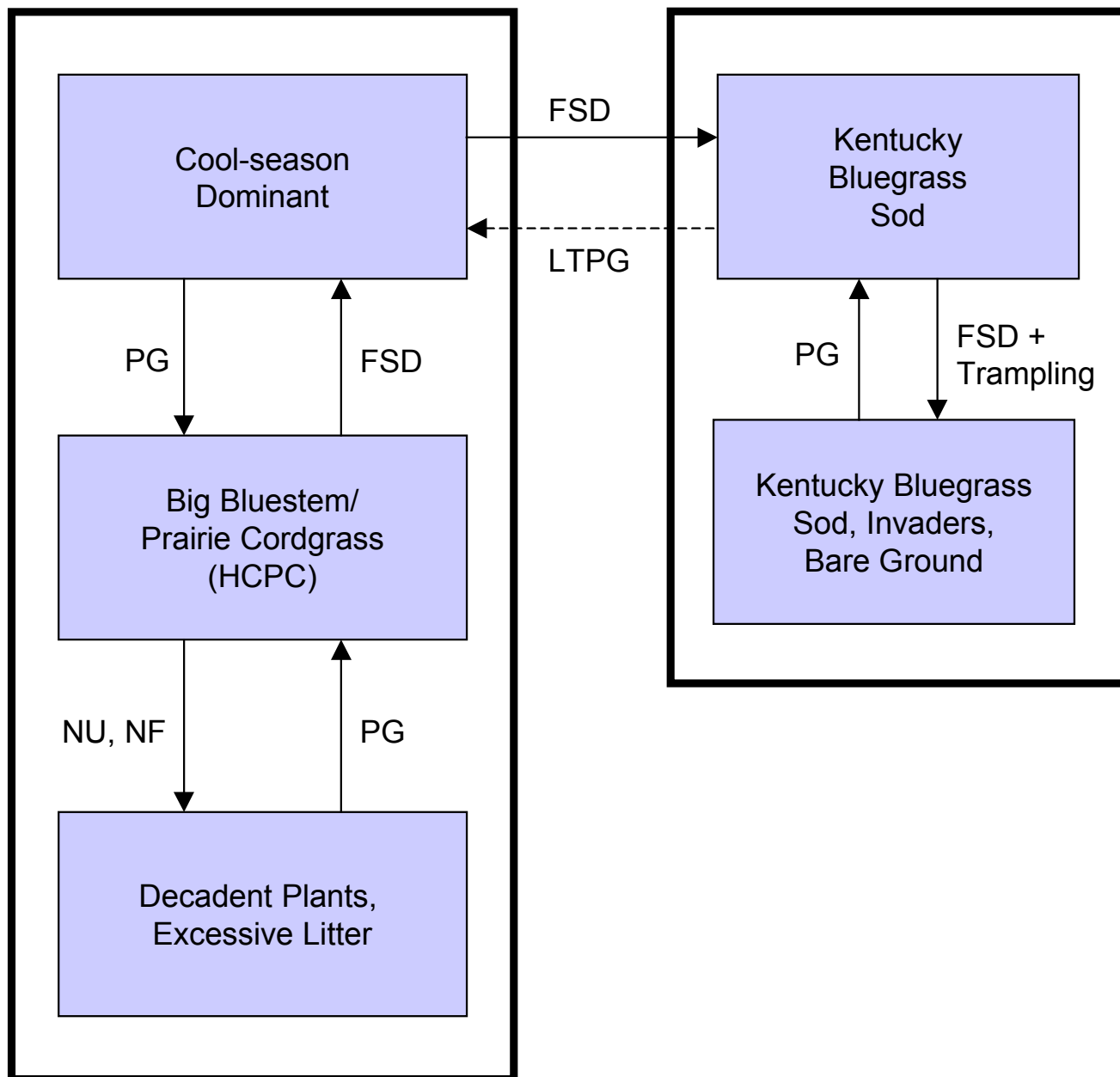
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions between communities that will occur, severe disturbances, such as periods of well-below average precipitation, can cause significant shifts in plant communities and/or species composition.

As this site deteriorates from a combination of frequent and severe grazing, species such as Kentucky bluegrass, Baltic rush, scouring rush and other various grass-like will increase forming a cool season dominated plant community. Kentucky bluegrass will eventually become sod-bound. Grasses such as big bluestem, prairie cordgrass and switchgrass will decrease in frequency and production and can eventually be removed from the site. As the site continues to deteriorate, bare ground may increase depending on water table depth. Kentucky bluegrass will persist in a broken sod appearance. Species such as Dalmatian toadflax, kochia, and leafy spurge will invade the site. Excessive litter, decadence and plant mortality can result from the lack of fire or non-use.

The plant community upon which interpretations are primarily based is the Historic Climax Plant Community (HCPC). The HCPC has been determined by studying rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



FSD - Frequent severe defoliation; **HCPC** - Historic Climax Plant Community;
LTPG - Long-term prescribed grazing; **NU, NF** - Non-use, no fire; **PG** - Prescribed grazing with adequate recovery opportunity.

Plant Community Composition and Group Annual Production

			Big Bluestem/Prairie Cordgrass (HCPC)		
COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				3440 - 3870	80 - 90
WARM SEASON TALL & MID GRASSES			1	2150 - 2795	50 - 65
big bluestem	Andropogon gerardii	ANGE	1	860 - 1505	20 - 35
prairie cordgrass	Spartina pectinata	SPPE	1	430 - 860	10 - 20
switchgrass	Panicum virgatum	PAVI2	1	215 - 645	5 - 15
COOL-SEASON TALL & MID GRASSES			2	430 - 860	10 - 20
western wheatgrass	Pascopyrum smithii	PASM	2	215 - 430	5 - 10
slender wheatgrass	Elymus trachycaulus ssp. trachycaulus	ELTRT	2	215 - 430	5 - 10
basin wildrye	Leymus cinereus	LECI4	2	0 - 430	0 - 10
OTHER NATIVE GRASSES			3	215 - 430	5 - 10
green muhly	Muhlenbergia racemosa	MURA	3	0 - 215	0 - 5
Canada wildrye	Elymus canadensis	ELCA4	3	0 - 215	0 - 5
bluegrass	Poa spp.	POA	3	0 - 215	0 - 5
alkali sacaton	Sporobolus airoides	SPAI	3	0 - 215	0 - 5
foxtail barley	Hordeum jubatum	HOJU	3	0 - 215	0 - 5
inland saltgrass	Distichlis spicata	DISP	3	0 - 215	0 - 5
prairie wedgescale	Sphenopholis obtusata	SPOB	3	0 - 86	0 - 2
other perennial grasses		2GP	3	0 - 215	0 - 5
GRASS-LIKES			4	215 - 430	5 - 10
sedge	Carex spp.	CAREX	4	0 - 430	0 - 10
Baltic rush	Juncus balticus	JUBA	4	0 - 86	0 - 2
bulrush	Schoenoplectus spp.	SCHOE6	4	0 - 86	0 - 2
rush	Juncus spp.	JUNCU	4	0 - 86	0 - 2
horsetail	Equisetum laevigatum	EQLA	4	0 - 86	0 - 2
spikerush	Eleocharis spp.	ELEOC	4	0 - 86	0 - 2
FORBS			6	215 - 430	5 - 10
American licorice	Glycyrrhiza lepidota	GLLE3	6	0 - 129	0 - 3
arrowgrass	Triglochin palustre	TRPA6	6	0 - 43	0 - 1
cudweed sagewort	Artemisia ludoviciana	ARLU	6	0 - 86	0 - 2
false boneset	Brickellia eupatorioides	BREU	6	0 - 86	0 - 2
gayfeather	Liatris spp.	LIATR	6	0 - 129	0 - 3
goldenrod	Solidago spp.	SOLID	6	0 - 129	0 - 3
heath aster	Symphyotrichum ericoides	SYER	6	0 - 129	0 - 3
Maximilian sunflower	Helianthus maximiliani	HEMA2	6	0 - 129	0 - 3
Pennsylvania smartweed	Polygonum pensylvanicum	POPE2	6	0 - 129	0 - 3
prairie clover	Dalea spp.	DALEA	6	0 - 129	0 - 3
Pursh seepweed	Suaeda calceoliformis	SUCA2	6	0 - 43	0 - 1
Rocky Mountain iris	Iris missouriensis	IRMI	6	0 - 43	0 - 1
showy milkweed	Asclepias speciosa	ASSP	6	0 - 43	0 - 1
western ragweed	Ambrosia psilostachya	AMPS	6	0 - 86	0 - 2
wild strawberry	Fragaria virginiana	FRVI	6	0 - 86	0 - 2
other perennial forbs		2FP	6	0 - 129	0 - 3
SHRUBS			7	0 - 430	0 - 10
willow	Salix spp.	SALIX	7	0 - 430	0 - 10
rose	Rosa spp.	ROSA5	7	0 - 215	0 - 5
false indigo	Amorpha fruticosa	AMFR	7	0 - 215	0 - 5
silver buffaloberry	Shepherdia argentea	SHAR	7	0 - 215	0 - 5
western snowberry	Symphoricarpos occidentalis	SYOC	7	0 - 215	0 - 5
other shrubs		2SHRUB	7	0 - 215	0 - 5
Annual Production lbs./acre			LOW RV HIGH		
GRASSES & GRASS-LIKES			3290 - 3763 - 4100		
FORBS			210 - 323 - 450		
SHRUBS			0 - 215 - 450		
TOTAL			3500 - 4300 - 5000		

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value.

Plant Community Composition and Group Annual Production

		Big Bluestem/ Prairie Cordgrass (HCPC)			Cool-season Dominant			Decadent Plants, Excessive Litter			Kentucky Bluegrass Sod		
COMMON/GROUP NAME	SYMBOL	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			3440 - 3870	80 - 90		2250 - 2700	75 - 90		2640 - 2970	80 - 90		1300 - 1700	65 - 85
WARM-SEASON TALL & MID		1	2150 - 2795	50 - 65	1	150 - 450	5 - 15	1	495 - 1485	15 - 45	1		
big bluestem	ANGE	1	860 - 1505	20 - 35	1	0 - 150	0 - 5	1	165 - 660	5 - 20			
prairie cordgrass	SPPE	1	430 - 860	10 - 20	1	0 - 150	0 - 5	1	165 - 330	5 - 10			
switchgrass	PAVI2	1	215 - 645	5 - 15	1	0 - 150	0 - 5	1	0 - 165	0 - 5			
COOL-SEASON TALL & MID		2	430 - 860	10 - 20	2	750 - 1050	25 - 35	2	660 - 990	20 - 30	2	0 - 200	0 - 10
western wheatgrass	PASM	2	215 - 430	5 - 10	2	600 - 1050	20 - 35	2	495 - 825	15 - 25	2	0 - 200	0 - 10
slender wheatgrass	ELTRT	2	215 - 430	5 - 10	2	150 - 300	5 - 10	2	165 - 330	5 - 10			
basin wildrye	LECI4	2	0 - 430	0 - 10				2	0 - 330	0 - 10			
OTHER NATIVE GRASSES		3	215 - 430	5 - 10	3	150 - 600	5 - 20	3	165 - 495	5 - 15	3	100 - 600	5 - 30
green muhly	MURA	3	0 - 215	0 - 5				3	0 - 99	0 - 3			
Canada wildrye	ELCA4	3	0 - 215	0 - 5				3	0 - 165	0 - 5			
bluegrass	POA	3	0 - 215	0 - 5	3	60 - 300	2 - 10	3	0 - 264	0 - 8	3	0 - 200	0 - 10
alkali sacaton	SPA1	3	0 - 215	0 - 5				3	0 - 99	0 - 3			
foxtail barley	HOJU	3	0 - 215	0 - 5	3	150 - 300	5 - 10	3	66 - 264	2 - 8	3	100 - 200	5 - 10
inland saltgrass	DISP	3	0 - 215	0 - 5	3	60 - 300	2 - 10	3	0 - 165	0 - 5	3	40 - 200	2 - 10
prairie wedgescale	SPOB	3	0 - 86	0 - 2	3	0 - 60	0 - 2	3	0 - 66	0 - 2			
other perennial grasses	2GP	3	0 - 215	0 - 5		0 - 150	0 - 5	3	0 - 165	0 - 5	3	0 - 60	0 - 3
GRASS-LIKES		4	215 - 430	5 - 10	4	150 - 600	5 - 20	4	165 - 495	5 - 15	4	200 - 500	10 - 25
sedge	CAREX	4	215 - 430	5 - 10	4	150 - 450	5 - 15	4	165 - 330	5 - 10	4	100 - 200	5 - 10
Baltic rush	JUBA	4	0 - 86	0 - 2	4	60 - 300	2 - 10	4	66 - 165	2 - 5	4	100 - 300	5 - 15
bulrush	SCHOE6	4	0 - 86	0 - 2	4	0 - 90	0 - 3	4	0 - 99	0 - 3	4	0 - 100	0 - 5
rush	JUNCU	4	0 - 86	0 - 2	4	0 - 150	0 - 5	4	0 - 165	0 - 5	4	0 - 100	0 - 5
horsetail	EQUIS	4	0 - 86	0 - 2	4	0 - 150	0 - 5	4	0 - 99	0 - 3	4	0 - 100	0 - 5
spikerush	ELEOC	4	0 - 86	0 - 2	4	0 - 150	0 - 5	4	0 - 99	0 - 3	4	0 - 60	0 - 3
NON-NATIVE GRASSES		5			5	150 - 450	5 - 15	5	165 - 495	5 - 15	5	300 - 800	15 - 40
Kentucky bluegrass	POPR				5	150 - 450	5 - 15	5	165 - 330	5 - 10	5	300 - 700	15 - 35
cheatgrass	BRTE				5	0 - 150	0 - 5	5	66 - 264	2 - 8	5	40 - 200	2 - 10
FORBS		6	215 - 430	5 - 10	6	150 - 450	5 - 15	6	165 - 330	5 - 10	6	200 - 400	10 - 20
American licorice	GLLE3	6	0 - 129	0 - 3	6	0 - 150	0 - 5	6	0 - 132	0 - 4	6	0 - 100	0 - 5
arrowgrass	TRPA6	6	0 - 43	0 - 1	6	0 - 90	0 - 3	6	0 - 66	0 - 2	6	0 - 60	0 - 3
cocklebur	XANTH2				6	0 - 60	0 - 2	6	0 - 33	0 - 1	6	0 - 100	0 - 5
cudweed sagewort	ARLU	6	0 - 86	0 - 2	6	30 - 120	1 - 4	6	33 - 99	1 - 3	6	0 - 60	0 - 3
curly dock	RUCR				6	0 - 90	0 - 3	6	0 - 66	0 - 2	6	0 - 100	0 - 5
false boneset	BREU	6	0 - 86	0 - 2				6	0 - 33	0 - 1			
gayfeather	LIATR	6	0 - 129	0 - 3	6	0 - 90	0 - 3	6	0 - 99	0 - 3	6	0 - 40	0 - 2
goldenrod	SOLID	6	0 - 129	0 - 3	6	0 - 210	0 - 7	6	0 - 165	0 - 5	6	40 - 160	2 - 8
heath aster	SYER	6	0 - 129	0 - 3	6	60 - 240	2 - 8	6	0 - 99	0 - 3	6	40 - 160	2 - 8
kochia	KOSC				6	0 - 60	0 - 2				6	0 - 160	0 - 8
Maximilian sunflower	HEMA2	6	0 - 129	0 - 3				6	0 - 33	0 - 1			
Pennsylvania smartweed	POPE2	6	0 - 129	0 - 3	6	0 - 150	0 - 5	6	0 - 99	0 - 3	6	0 - 100	0 - 5
prairie clover	DALEA	6	0 - 129	0 - 3	6	0 - 90	0 - 3	6	0 - 99	0 - 3			
Pursh seepweed	SUCA2	6	0 - 43	0 - 1	6	0 - 60	0 - 2	6	0 - 33	0 - 1	6	0 - 40	0 - 2
Rocky Mountain iris	IRMI	6	0 - 43	0 - 1	6	0 - 90	0 - 3	6	0 - 33	0 - 1	6	0 - 100	0 - 5
Russian thistle	SALSO				6	0 - 60	0 - 2				6	0 - 100	0 - 5
showy milkweed	ASSP	6	0 - 43	0 - 1	6	0 - 60	0 - 2	6	0 - 33	0 - 1	6	0 - 60	0 - 3
thistle	CIRSI				6	0 - 90	0 - 3	6	0 - 66	0 - 2	6	0 - 160	0 - 8
western ragweed	AMPS	6	0 - 86	0 - 2	6	0 - 90	0 - 3	6	0 - 99	0 - 3	6	0 - 60	0 - 3
wild strawberry	FRVI	6	0 - 86	0 - 2									
other perennial forbs	2FP	6	0 - 129	0 - 3	6	0 - 90	0 - 3	6	0 - 99	0 - 3	6	0 - 60	0 - 3
other annual forbs	2FA				6	0 - 90	0 - 3	6	0 - 66	0 - 2	6	0 - 160	0 - 8
SHRUBS		7	0 - 430	0 - 10	7	0 - 300	0 - 10	7	0 - 330	0 - 10	7	40 - 300	2 - 15
willow	SALIX	7	0 - 430	0 - 10	7	0 - 150	0 - 5	7	0 - 330	0 - 10	7	0 - 20	0 - 1
rose	ROSA5	7	0 - 215	0 - 5	7	0 - 150	0 - 5	7	0 - 99	0 - 3	7	0 - 100	0 - 5
false indigo	AMFR	7	0 - 215	0 - 5	7	0 - 150	0 - 5	7	0 - 165	0 - 5	7	0 - 60	0 - 3
silver buffaloberry	SHAR	7	0 - 215	0 - 5	7	0 - 150	0 - 5	7	0 - 165	0 - 5	7	0 - 20	0 - 1
western snowberry	SYOC	7	0 - 215	0 - 5	7	0 - 150	0 - 5	7	0 - 165	0 - 5	7	20 - 200	1 - 10
other shrubs	2SHRUB	7	0 - 215	0 - 5	7	0 - 150	0 - 5	7	0 - 165	0 - 5	7	0 - 60	0 - 3
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		
GRASSES & GRASS-LIKES			3290 - 3763 - 4100		2255 - 2550 - 2775		2740 - 2888 - 3300		1370 - 1530 - 1650				
FORBS			210 - 323 - 450		145 - 300 - 500		160 - 248 - 350		195 - 300 - 425				
SHRUBS			0 - 215 - 450		0 - 150 - 325		0 - 165 - 350		35 - 170 - 325				
TOTAL			3500 - 4300 - 5000		2400 - 3000 - 3600		2900 - 3300 - 4000		1600 - 2000 - 2400				

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value.

Plant Community and Vegetation State Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more information is collected, some of these plant community descriptions may be revised or removed, and new ones added. None of these plant communities should necessarily be thought of as "Desired Plant Communities". According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC's) will be determined by the decision makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Big Bluestem/Prairie Cordgrass Plant Community

The plant community upon which interpretations are primarily based is the Big Bluestem/Prairie Cordgrass Plant Community. This is also considered to be the Historic Climax Plant Community (HCPC). This plant community can be found on areas where grazed plants receive adequate periods of deferment during the growing season in order to recover. Historically, fires occurred infrequently. The potential vegetation is about 80-90% grasses and grass-like, 5-10% forbs and 0-10% shrubs. Tall and mid warm season grasses dominate this community. Major grasses include big bluestem, prairie cordgrass and switchgrass. Other grasses and grass-like occurring on the community include western wheatgrass, Canada wildrye, Baltic rush, spikerush, and bulrush. Key forbs and shrubs include American licorice, Maximilian sunflower, milkvetch and willow.

This plant community is diverse, stable, productive and well adapted to the Northern Great Plains. The high water table supplies much of the moisture for plant growth. Plant litter is properly distributed with little movement and natural plant mortality is very low. This is a sustainable plant community in terms of soil stability, watershed function and biologic integrity.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6010

Growth curve name: Pierre Shale Plains, lowland warm-season dominant.

Growth curve description: Warm-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	8	15	21	26	15	8	5	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Frequent and severe defoliation will shift this plant community to the *Cool-season Dominant Plant Community*.
- Non-use and no fire will convert the HCPC to the *Decadent Plants, Excessive Litter Plant Community*. Initially, excess litter begins to build-up. Eventually native plants can show signs of mortality and decadence.

Cool-season Dominant Plant Community

This plant community developed under frequent and severe defoliation without periodic deferment. Big bluestem, prairie cordgrass, Indiangrass, switchgrass, and Canada wildrye have been significantly reduced. Western wheatgrass will increase, while Kentucky bluegrass will begin to invade. Non-palatable forbs such as heath aster and ironweed have increased. Palatable forbs and shrubs are still present in small amounts. This plant community is at risk of losing tall warm season grasses, palatable forbs and shrubs.

This community indicates key management concerns. Prescribed grazing at this point will stabilize the community at or near the HCPC, while increased disturbance can easily move the community to a more degraded state. While plant diversity has been reduced, the soil is stable. The water cycle, nutrient cycle and energy flow is slightly reduced but continues to adequately function.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6007

Growth curve name: Pierre Shale Plains, cool-season dominant, warm-season sub-dominant.

Growth curve description: Cool-season dominant, warm-season sub-dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	13	20	25	18	11	5	3	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Frequent and severe defoliation shifts this plant community to the *Kentucky Bluegrass Sod Plant Community*.
- Prescribed grazing with adequate recovery opportunity between grazing events will restore this community back to the *Big Bluestem/Prairie Cordgrass Plant Community (HCPC)*.

Decadent Plants, Excessive Litter Plant Community

This plant community occurs after an extended period of non-use, and where fire has been eliminated. The dominant plants tend to be similar to those found in the Historic Climax Plant Community, however in advanced stages, frequency and production can be lower. Litter amounts have increased causing plants to become decadent. Much of the plant nutrients are tied up in excessive litter. Organic matter oxidizes in the air rather than being incorporated into the soil due to the absence of animal impact. Typically, bunchgrasses develop dead centers and rhizomatous grasses (prairie cordgrass) form small colonies because of a lack of tiller stimulation.

This plant community is not resistant to change. Grazing or fire can easily move it toward the HCPC. Soil erosion is not a concern due to increased litter levels and landscape position.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6006

Growth curve name: Pierre Shale Plains, lowland cool-season dominant.

Growth curve description: Cool-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	6	15	20	26	17	9	4	3	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Prescribed grazing or fire will shift this plant community towards the *Big Bluestem/Prairie Cordgrass Plant Community (HCPC)*.

Kentucky Bluegrass Sod Plant Community

This plant community developed with further frequent and severe defoliation. The plant community is predominantly cool season grasses and grass-like. Kentucky bluegrass has fully invaded the community and persists in a sod-bound condition. Baltic rush, various sedges, and foxtail barley have increased. Remnant amounts of western wheatgrass may still persist in localized colonies. Big bluestem, prairie cordgrass and switchgrass have been removed. Forbs such as kochia and Russian thistle have also increased.

This community remains stable but has lost much of its production and diversity. The nutrient cycle is impaired due to the loss of warm season grass species, deep-rooted forbs (legumes and others) and shrubs. Soil compaction can be a concern if continuously grazed during wet cycles. It will take a long time to bring this plant community back to the HCPC with management alone. Renovation would be very costly.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6006

Growth curve name: Pierre Shale Plains, lowland cool-season dominant.

Growth curve description: Cool-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	6	15	20	26	17	9	4	3	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Continued frequent and severe defoliation with trampling will eventually shift this plant community to the *Kentucky Bluegrass Sod, Invaders, Bare Ground Plant Community*.
- Long-term prescribed grazing will move this plant community to the *Cool-season Dominant Plant Community* and will eventually return to the *HCPC* or associated successional plant stages assuming an adequate seed/vegetative source is available. This process will require a long period of time and may be difficult to attain depending on the degree of degradation.

Kentucky Bluegrass Sod, Invaders, Bare Ground Plant Community

This plant community develops with further frequent and severe defoliation and trampling during the growing season. High stock densities have resulted in trampling of the vegetation and compaction of the soil surface. Kentucky bluegrass still dominates the community; however, areas of sod have been removed resulting in a broken sod-bound appearance. Bare ground may be a concern if water table levels are low. Dalmatian toadflax, cheatgrass and leafy spurge tend to invade.

Compared to the Historic Climax Plant Community, all perennial plants have been greatly reduced with only remnants of the most grazing tolerant species remaining. Plant diversity and production are very low. Planned deferment during the growing season will improve the vigor of any the plant species present. Wind and water erosion may occur if bare ground has increased. Litter amounts are greatly reduced. Mineral crusting caused by raindrop impact disrupts surface soil aggregates, increasing ponding and slowing infiltration. Continued heavy use will cause severe compaction problems. Animal wastes can contaminate ground water or runoff.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: SD6006

Growth curve name: Pierre Shale Plains, lowland cool-season dominant.

Growth curve description: Cool-season dominant, lowland.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	6	15	20	26	17	9	4	3	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Prescribed grazing will move this plant community back to the *Kentucky Bluegrass Sod Plant Community*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Big Bluestem/Prairie Cordgrass Plant Community (HCPC):

Cool-season Dominant Plant Community:

Kentucky Bluegrass Sod Plant Community:

Kentucky Bluegrass Sod, Invaders, Bare Ground Plant Community:

Decadent Plants, Excessive Litter Plant Community:

Animal Preferences (Quarterly – 1,2,3,4[†])

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & Grass-like							
alkali sacaton	U D D U	N U N N	U D D U	N U N N	N U N N	U D D U	U D D U
Baltic rush	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
basin wildrye	U P U D	U P U U	U P U D	D D D D	D D D D	U P U D	U P U D
big bluestem	U D P D	U U D U	U D P D	U D U U	U D U U	U D P D	U D P D
bluegrass	U D U U	D P U D	U D U U	U P N D	U P N D	U D U U	U D U U
bulrush	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
Canada wildrye	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U U
foxtail barley	U D N N	N P N N	U D N N	N P N N	N P N N	U D N N	U D N N
green muhly	U D D U	N U N N	U D D U	N U N N	N U N N	U D D U	U D D U
horsetail	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
inland saltgrass	N U U N	N N N N	N U U N	N N N N	N N N N	N U U N	N U U N
prairie cordgrass	U D D U	N N N N	U D D U	N N N N	N N N N	U D D U	U D D U
prairie wedgescale	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U U
rush	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
sedge	U P U D	U P U D	U D U D	U D U D	U D U D	U D U D	U D U D
slender wheatgrass	U P U U	U D U U	U P U U	N D U N	N D U N	U P U U	U P U U
spikerush	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
western wheatgrass	U P D D	U D U U	U P D U	N D N N	N D N N	U P D U	U P D U
Forbs							
American licorice	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
arrowgrass	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
false boneset	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
Maximilian sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
Pennsylvania smartweed	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	N N N N
prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
Pursh seepweed	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
Rocky Mountain iris	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
showy milkweed	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
western ragweed	U U U U	U U U U	U U U U	N N N N	N N N N	U U U U	N N N N
wild strawberry	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
Shrubs							
false indigo	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
silver buffaloberry	D U U U	D U U U	D U U U	P U D P	U U U U	D U U U	D U U U
western snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U
willow	P U D P	P U D P	P U D P	P U D P	U U U U	P U D P	P U D P

N = not used; **U** = undesirable; **D** = desirable; **P** = preferred; **T** = toxic

[†] Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

Animal Community – Grazing Interpretations

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Big Bluestem/Prairie Cordgrass	4300	1.36
Cool-season Dominant	3000	0.95
Kentucky Bluegrass Sod	2000	0.63
Kentucky Bluegrass Sod, Invaders, Bare Ground	1600	0.51**
Decadent Plants, Excessive Litter	3300	1.04**

* Based on 790 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25% harvest efficiency (refer to USDA NRCS, National Range and Pasture Handbook).

** Highly variable; stocking rate needs to be determined on site.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils from hydrologic groups A to D. Infiltration and runoff potential for this site varies from very low to high depending on soil hydrologic group, slope and water table. Runoff may be high on this site if the soil becomes saturated (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational Uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood Products

Other Products

Seed harvest of native plant species can provide additional income on this site.

Supporting Information

Associated Sites

(060AY002SD) – Wet Land

(060AY021SD) – Clayey Overflow

(060AY007SD) – Saline Lowland

(060AY020SD) – Loamy Overflow

(060AY042SD) – Lowland

Similar Sites

(060AY002SD) – Wet Land

[higher production; more frequent ponding and higher water table]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Those involved in developing this site description include: Stan Boltz, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; Cheryl Nielsen, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; Mike Stirling, Range Management Specialist, NRCS.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417				

State Correlation

This site has been correlated between Montana, Nebraska, South Dakota & Wyoming in MLRA 60A.

Field Offices

Belle Fourche, SD	Custer, SD	Hot Springs, SD	Pine Ridge, SD	Sundance, WY
Broadus, MT	Ekalaka, MT	Lusk, WY	Rapid City, SD	Wall, SD
Buffalo, SD	Faith, SD	Martin, SD	Rushville, NE	
Chadron, NE	Gillette, WY	Newcastle, WY	Sturgis, SD	

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe, 43g – Semiarid Pierre Shale Plains, and 43k – Dense Clay Prairie.

Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://hpccsun.unl.edu>)

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://wcc.nrcs.usda.gov>)

USDA, NRCS. National Range and Pasture Handbook, September 1997

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://nasis.nrcs.usda.gov>)

USDA, NRCS, 2002. National Soil Survey Handbook, title 430-VI. (<http://soils.usda.gov/procedures/handbook/main.htm>)

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

Site Description Approval

MT, State Range Management Specialist Date

NE, State Range Management Specialist Date

SD, State Range Management Specialist Date

WY, State Range Management Specialist Date